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REE Inversion and Geochemical studies of the basic dykes from the southern margin of the (Proterozoic) Cuddapah Basin, southern India

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Geochemical characters of basic dykes intruding the Archaean basement at the southern margin of the Cuddapah Basin of southern India show evidence of mantle plume source (Th/Ta = 4.7 to 12.9 and La/Yb = 8.2 to 13.0) with similarity in intra-plate basalts and indicate crustal contamination (Nb/La = 0.31 to 0.39 and Ba/Nb = 48.9 to 92.4), mostly ancient granite and sometimes amphibolites or contribution of subduction-modified lithospheric mantle. REE inversion studies indicate melting (~ 14.5 %) of metasomatically enriched lithosphere. They also show that the depth of melting is around 100 km with an upper limit of 70 km, which possibly indicates that the mantle plume, by which these rocks have been formed, lies beneath the old thick south Indian lithosphere at a depth of 70 km. A close match between some of these dyke compositions of Proterozoic age and the Deccan Bushe flows (crustally contaminated) of Cretaceous age possibly indicates the presence of similar magma sources, igneous processes as well as depth of melting. It seems very likely that both in the Proterozoic and in the Cretaceous times the Peninsular Indian continent experienced very similar tectono-volcanic activity.

Keywords: Cuddapah Basin, Mantle Plume, REE inversion, contamination.